

What is claimed is:

1. A method of cementing, comprising the steps of:
providing a cement composition comprising a hydraulic cement, a set retarder, and a particle-size distribution-adjusting agent;
activating the cement composition;
placing the cement composition in a desired location; and
permitting the cement composition to set therein.
2. The method of claim 1 wherein the cement composition further comprises water, and wherein the water is fresh water, salt water, brine, sea water, or a mixture thereof.
3. The method of claim 2 wherein the water is present in the cement composition in an amount sufficient to form a pumpable slurry.
4. The method of claim 3 wherein the water is present in the cement composition in an amount in the range of from about 25% to about 150% by weight of the cement.
5. The method of claim 1 wherein the hydraulic cement is a Portland cement, pozzolana cement, gypsum cement, high alumina cement, silica cement, or a high alkalinity cement.
6. The method of claim 2 wherein the step of providing a cement composition comprises providing a densified cement composition.
7. The method of claim 6 wherein the step of providing a densified cement composition comprises the step of adding high-density particles to the cement composition.
8. The method of claim 6 wherein the step of providing a densified cement composition comprises the step of reducing the amount of water in the cement composition.
9. The method of claim 6 wherein the cement composition further comprises a yield stress reducing agent.
10. The method of claim 1 wherein the set retarder is phosphonic acid or a phosphonic acid derivative.
11. The method of claim 10 wherein the phosphonic acid derivative is a sodium salt of phosphonic acid.

12. The method of claim 1 wherein the set retarder is present in the cement composition in an amount in the range of from about 0.1% to about 5% by weight of the cement.

13. The method of claim 1 wherein the step of activating the cement composition comprises adding an activator composition to the cement composition.

14. The method of claim 13 wherein the activator composition is added in an amount sufficient to enable the cement composition to achieve a desired compressive strength in a desired thickening time.

15. The method of claim 14 wherein the activator composition is added in an amount in the range of from about 0.1 to about 5% by weight of the cement.

16. The method of claim 15 wherein the activator composition comprises a mixture of a trialkanolamine and an alkali or alkaline earth metal hydroxide.

17. The method of claim 16 wherein the trialkanolamine is selected from the group consisting of: triethanolamine, tripropanolamine, and triisopropanolamine.

18. The method of claim 16 wherein the alkali or alkaline earth metal hydroxide is selected from the group consisting of sodium hydroxide and potassium hydroxide.

19. The method of claim 16 wherein the trialkanolamine is present in an amount in the range of from about 0.1% to about 50% by weight of the activator composition.

20. The method of claim 16 wherein the alkali metal hydroxide is present in an amount in the range of from about 50% to about 99.9% by weight of the activator composition.

21. The method of claim 18 wherein the alkali metal hydroxide is sodium hydroxide.

22. The method of claim 16 wherein the activator composition is added to the cement composition in the form of a solution diluted by water.

23. The method of claim 16 wherein the activator composition is added to the cement composition while the cement composition is in storage.

24. The method of claim 16 wherein the activator composition is added to the cement composition while the cement composition is being placed in the subterranean formation.

25. The method of claim 1 wherein the particle-size distribution-adjusting agent is present in the cement composition in an amount sufficient to adjust the particle-size distribution of the cement composition to a desired range.

26. The method of claim 1 wherein the cement composition comprising the particle-size distribution-adjusting agent has a particle-size distribution that is narrower than that of the cement composition lacking the particle-size distribution-adjusting agent.

27. The method of claim 1 wherein the particle-size distribution-adjusting agent is present in the cement composition in an amount in the range of from about 0.01% to about 4% by weight of the cement.

28. The method of claim 1 wherein the particle-size distribution-adjusting agent is a compound that affects the particle-size distribution of the cement such that the rheology of the cement composition remains substantially stable for a desired period of time.

29. The method of claim 1 wherein the particle-size distribution-adjusting agent is a cationic polymer.

30. The method of claim 29 wherein the cationic polymer is selected from the group consisting of: cationic polyacrylamides; cationic hydroxyethyl cellulose; poly(dimethyldiallylammonium chloride); and cationic starches.

31. The method of claim 1 wherein the cement composition further comprises a surfactant, a dispersant, a salt, mica, a formation conditioning agent, a fixed-density weighting agent, vitrified shale, fumed silica, bentonite, fly ash, a fluid loss control additive, an expanding additive, a defoamer, a viscosifier, or a mixture thereof.

32. The method of claim 1 further comprising the step of permitting the cement composition to remain in a slurry state for at least 24 hours.

33. The method of claim 1 further comprising the step of permitting the cement composition to remain in a slurry state for at least two weeks.

34. The method of claim 1 further comprising the step of permitting the cement composition to remain in a slurry state for more than two weeks.

35. The method of claim 1 wherein the suspension properties of the cement composition are substantially uniform throughout the cement composition.

36. The method of claim 32 wherein the rheological properties of the cement composition remain substantially constant while the cement composition remains in a slurry state.

37. The method of claim 9 wherein the yield stress reducing agent is selected from the group consisting of: a sulfonated melamine formaldehyde condensate; a sulfonated naphthalene condensate; and a sulfite adduct of an acetone formaldehyde condensate.

38. The method of claim 1 wherein the cement composition has a density in the range of from about 4 pounds per gallon to about 25 pounds per gallon.

39. The method of claim 1 wherein the cement composition further comprises water, and wherein the water is present in the cement composition in an amount in the range of from about 25% to about 150% by weight of the cement; wherein the set retarder is a phosphonic acid or phosphonic acid derivative; wherein the step of selectively activating the cement composition comprises adding an activator composition to the cement composition; wherein the activator composition comprises a mixture of triethanolamine and an alkali metal hydroxide; wherein the particle-size distribution-adjusting agent is present in the cement composition in an amount in the range of from about 0.01 % to about 4 % by weight of the cement; wherein the particle-size distribution-adjusting agent is a cationic polymer.

40. A method of drilling in a subterranean formation comprising the step of drilling a well bore in a subterranean formation using a drilling fluid comprising a cement, a set retarder, and a particle-size distribution-adjusting agent.

41. The method of claim 40 further comprising the step of placing a casing string within the well bore.

42. The method of claim 40 further comprising the step of mixing an activator composition with the drilling fluid.

43. The method of claim 40 further comprising the step of permitting the drilling fluid to set behind the casing string.

44. The method of claim 40 wherein the drilling fluid further comprises water, and wherein the water is fresh water, salt water, brine, sea water, or a mixture thereof.

45. The method of claim 44 wherein the water is present in the drilling fluid in an amount in the range of from about 25% to about 150% by weight of the cement.

46. The method of claim 40 wherein the hydraulic cement is a Portland cement, pozzolana cement, gypsum cement, high alumina cement, silica cement, or a high-alkalinity cement.

47. The method of claim 40 wherein the drilling fluid further comprises a yield stress reducing agent.

48. The method of claim 40 wherein the set retarder is phosphonic acid or a phosphonic acid derivative.

49. The method of claim 48 wherein the phosphonic acid derivative is a sodium salt of phosphonic acid.

50. The method of claim 40 wherein the set retarder is present in the drilling fluid in an amount in the range of from about 0.1% to about 5% by weight of the cement.

51. The method of claim 42 wherein the activator composition is added in an amount sufficient to enable the drilling fluid to achieve a desired compressive strength in a desired thickening time.

52. The method of claim 51 wherein the activator composition is added in an amount in the range of from about 0.1 to about 5% by weight of the cement.

53. The method of claim 52 wherein the activator composition comprises a mixture of a trialkanolamine and an alkali or alkaline earth metal hydroxide.

54. The method of claim 53 wherein the trialkanolamine is selected from the group consisting of: triethanolamine, tripropanolamine, and triisopropanolamine.

55. The method of claim 53 wherein the alkali or alkaline earth metal hydroxide is selected from the group consisting of sodium hydroxide and potassium hydroxide.

56. The method of claim 53 wherein the trialkanolamine is present in an amount in the range of from about 0.1% to about 50% by weight of the activator composition.

57. The method of claim 53 wherein the alkali metal hydroxide is present in an amount in the range of from about 50% to about 99.9% by weight of the activator composition.

58. The method of claim 55 wherein the alkali metal hydroxide is sodium hydroxide.

59. The method of claim 40 wherein the particle-size distribution-adjusting agent is present in the drilling fluid in an amount in the range of from about 0.01 % to about 4 % by weight of the cement.

60. The method of claim 40 wherein the particle-size distribution-adjusting agent is a cationic polymer.

61. The method of claim 60 wherein the cationic polymer is selected from the group consisting of: cationic polyacrylamides; cationic hydroxyethyl cellulose; poly(dimethyldiallylammonium chloride); and cationic starches.

62. The method of claim 47 wherein the yield stress reducing agent is selected from the group consisting of: a sulfonated melamine formaldehyde condensate; a sulfonated naphthalene condensate; and a sulfite adduct of an acetone formaldehyde condensate.

63. A method of using a fluid in a subterranean formation comprising the step of: placing a displacement fluid comprising a cement, a set retarder, a particle-size distribution-adjusting agent, and an activator composition in a well bore in a subterranean formation so as to displace a second fluid therefrom.

64. The method of claim 63 wherein the second fluid is a drilling fluid.

65. The method of claim 63 further comprising the step of placing a casing string within the well bore.

66. The method of claim 63 further comprising the step of placing a cement composition within the well bore so as to displace at least a portion of the displacement fluid therefrom.

67. The method of claim 63 further comprising the step of permitting the cement composition to set in the well bore.

68. The method of claim 63 further comprising the step of permitting any undisplaced displacement fluid to set in the well bore.

69. The method of claim 63 wherein the displacement fluid further comprises water, and wherein the water is fresh water, salt water, brine, sea water, or a mixture thereof.

70. The method of claim 69 wherein the water is present in the displacement fluid in an amount in the range of from about 25% to about 150% by weight of the cement.

71. The method of claim 63 wherein the hydraulic cement is a Portland cement, pozzolana cement, gypsum cement, high alumina cement, silica cement, or a high alkalinity cement.

72. The method of claim 63 wherein the displacement fluid further comprises a yield stress reducing agent.

73. The method of claim 63 wherein the set retarder is phosphonic acid or a phosphonic acid derivative.

74. The method of claim 73 wherein the phosphonic acid derivative is a sodium salt of phosphonic acid.

75. The method of claim 63 wherein the set retarder is present in the displacement fluid in an amount in the range of from about 0.1% to about 5% by weight of the cement.

76. The method of claim 63 wherein the activator composition is present in an amount in the range of from about 0.1 to about 5% by weight of the cement.

77. The method of claim 63 wherein the activator composition comprises a mixture of a trialkanolamine and an alkali or alkaline earth metal hydroxide.

78. The method of claim 77 wherein the trialkanolamine is selected from the group consisting of: triethanolamine, tripropanolamine, and triisopropanolamine.

79. The method of claim 77 wherein the alkali or alkaline earth metal hydroxide is selected from the group consisting of sodium hydroxide and potassium hydroxide.

80. The method of claim 77 wherein the trialkanolamine is present in an amount in the range of from about 0.1% to about 50% by weight of the activator composition.

81. The method of claim 77 wherein the alkali metal hydroxide is present in an amount in the range of from about 50% to about 99.9% by weight of the activator composition.

82. The method of claim 79 wherein the alkali metal hydroxide is sodium hydroxide.

83. The method of claim 63 wherein the particle-size distribution-adjusting agent is present in the displacement fluid in an amount in the range of from about 0.01 % to about 4 % by weight of the cement.

84. The method of claim 63 wherein the particle-size distribution-adjusting agent is a cationic polymer.

85. The method of claim 84 wherein the cationic polymer is selected from the group consisting of: cationic polyacrylamides; cationic hydroxyethyl cellulose; poly(dimethyldiallylammonium chloride); and cationic starches.

86. The method of claim 72 wherein the yield stress reducing agent is selected from the group consisting of: a sulfonated melamine formaldehyde condensate; a sulfonated naphthalene condensate; and a sulfite adduct of an acetone formaldehyde condensate.

87. A settable fluid comprising a hydraulic cement, a set retarder, and a particle-size distribution-adjusting agent.

88. The settable fluid of claim 87 further comprising water, wherein the water comprises fresh water, salt water, brine, seawater, or a mixture thereof.

89. The settable fluid of claim 88 wherein the water is present in an amount sufficient to form a pumpable slurry.

90. The settable fluid of claim 89 wherein the water is present in an amount in the range of from about 25% to about 150% by weight of the cement.

91. The settable fluid of claim 87 wherein the hydraulic cement is a Portland cement, pozzolana cement, gypsum cement, high alumina cement, silica cement, or a high alkalinity cement.

92. The settable fluid of claim 87 further comprising a yield stress reducing agent.

93. The settable fluid of claim 92 wherein the yield stress reducing agent is selected from the group consisting of: a sulfonated melamine formaldehyde condensate, and a sulfite adduct of an acetone formaldehyde condensate.

94. The settable fluid of claim 87 wherein the set retarder is phosphonic acid or a phosphonic acid derivative.

95. The settable fluid of claim 94 wherein the phosphonic acid derivative is a sodium salt of phosphonic acid.

96. The settable fluid of claim 87 wherein the set retarder is present in an amount in the range of from about 0.1% to about 5% by weight of the cement.

97. The settable fluid of claim 87 further comprising an activator composition.

98. The settable fluid of claim 97 wherein the activator composition is present in an amount in the range of from about 0.1% to about 5% by weight of the cement.

99. The settable fluid of claim 97 wherein the activator composition comprises a mixture of a trialkanolamine and an alkali or alkaline earth metal hydroxide.

100. The settable fluid of claim 99 wherein the trialkanolamine is selected from the group consisting of: triethanolamine, tripropanolamine, and triisopropanolamine.

101. The settable fluid of claim 99 wherein the alkali or alkaline earth metal hydroxide is selected from the group consisting of sodium hydroxide and potassium hydroxide.

102. The settable fluid of claim 101 wherein the alkali metal hydroxide is sodium hydroxide.

103. The settable fluid of claim 99 wherein the trialkanolamine is present in an amount in the range of from about 0.1% to about 50% by weight of the activator composition.

104. The settable fluid of claim 99 wherein the alkali metal hydroxide is present in an amount in the range of from about 50% to about 99.9% by weight of the activator composition.

105. The settable fluid of claim 87 wherein the particle-size distribution-adjusting agent is present in an amount sufficient to adjust the particle-size distribution of the settable fluid to a desired range.

106. The settable fluid of claim 105 wherein the particle-size distribution-adjusting agent is present in an amount in the range of from about 0.01 % to about 4 % by weight of the cement.

107. The settable fluid of claim 87 wherein the particle-size distribution-adjusting agent is a compound that affects the particle size distribution of the settable fluid such that the rheology of the settable fluid remains substantially stable for a desired period of time.

108. The settable fluid of claim 87 wherein the particle-size distribution-adjusting agent is a cationic polymer.

109. The settable fluid of claim 108 wherein the cationic polymer is selected from the group consisting of: cationic polyacrylamides; cationic hydroxyethyl cellulose; poly(dimethyldiallylammonium chloride); and cationic starches.

110. The settable fluid of claim 87 further comprising a surfactant, a dispersant, a salt, mica, a formation conditioning agent, a fixed-density weighting agent, vitrified shale, fumed silica, bentonite, fly ash, a fluid loss control additive, an expanding additive, a defoamer, a viscosifier, or a mixture thereof.

111. The settable fluid of claim 87 wherein the suspension properties of the settable fluid are substantially uniform throughout the settable fluid.

112. The settable fluid of claim 87 having a density in the range of from about 4 pounds per gallon to about 25 pounds per gallon.

113. The settable fluid of claim 87 further comprising water, wherein the water is present in an amount in the range of from about 25% to about 150% by weight of the cement; wherein the set retarder is a phosphonic acid or phosphonic acid derivative; wherein the settable fluid further comprises an activator composition; wherein the activator composition comprises a mixture of triethanolamine and an alkali metal hydroxide; wherein the particle-size distribution-adjusting agent is present in the settable fluid in an amount in the range of from about 0.01% to about 4% by weight of the cement; wherein the particle-size distribution-adjusting agent is a cationic polymer.

114. An activator composition for activating a settable fluid comprising a mixture of a trialkanolamine and an alkali or alkaline earth metal hydroxide.

115. The activator composition of claim 114 wherein the trialkanolamine is selected from the group consisting of: triethanolamine, tripropanolamine, and triisopropanolamine.

116. The activator composition of claim 114 wherein the alkali or alkaline earth metal hydroxide is selected from the group consisting of: sodium hydroxide and potassium hydroxide.

117. The activator composition of claim 114 wherein the trialkanolamine is present in an amount in the range of from about 0.1% to about 50% by weight.

118. The activator composition of claim 114 wherein the alkali metal hydroxide is present in an amount in the range of from about 50% to about 99.9% by weight.

119. The activator composition of claim 116 wherein the alkali metal hydroxide is sodium hydroxide.

120. A particle-size distribution-adjusting agent for adjusting the particle size distribution of a settable fluid to a desired range, the particle-size distribution-adjusting agent comprising a cationic polymer.

121. The particle-size distribution-adjusting agent of claim 120 wherein the cationic polymer is selected from the group consisting of: cationic polyacrylamides; cationic hydroxyethyl cellulose; poly(dimethyldiallylammonium chloride); and cationic starches.

122. The particle-size distribution-adjusting agent of claim 120 wherein the cationic polymer is a cationic starch.